



the **ILLINOIS ENGINEER**



Examination for Professional Engineer, Page 5



DR. GEORGE E. EKBLAW, PRESIDENT I. S. P. E.

★ ★ ★
THE ILLINOIS ENGINEER, FEBRUARY, 1950—VOLUME XXVI, NO. 2

Address all communications to the Society at 204 Civil Engineering Hall, Urbana, Illinois.
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ILLINOIS ENGINEER: W. A. OLIVER, Editor-in-Chief; H. E. BABBITT, Associate Editor; MAX SUTER, Correspondent to American Engineer.

Of Professional Interest

W. D. P. WARREN ELECTED TO HONORARY MEMBERSHIP

Mr. W. D. P. Warren of the firm of Warren and Van Raag in Decatur was elected to Honorary Membership of the Illinois Society of Professional Engineers by a recent letter ballot to the society membership.

Mr. Warren has been a member of the Society since 1919. He has been an active participant in Society affairs during all the years of his membership. He has served on many committees, was Vice-President in 1926 and was President in 1927.

Among many public services he was a member of the First State of Illinois Professional Engineers Examining Committee during 1946-47.

The Society welcomes him into its group of distinguished Honorary Members.

W. D. GERBER RECEIVES 50 YEAR AWARD

Through an action taken by the Champaign County Chapter and approved by the Board of Direction, Mr. W. D. Gerber was presented with a certificate of appreciation for fifty years of membership in the Society. The presentation was made at the Annual Meeting in Decatur.

Mr. Gerber has served on many important committees during the years of his membership. He was Vice-President in 1916 and President in 1917. He is at present Engineer Emeritus, Illinois State Water Survey.

The Society extends to Mr. Gerber its best wishes for many years of activity.

Election of 1950 Officers—Official Report of Tellers.

Results of the Illinois Society of Professional Engineers Letters Ballot for the election of 1950 officers, Honorary Membership election and election of Junior Representative.

For President:

George E. Ekblaw.....	641
Write in ballots.....	4
Spoiled ballots	7
Total.....	652

For Vice-President:

Virgil E. Gunlock.....	639
Write in ballots.....	4
Spoiled ballots	7
Total.....	650

For Honorary Membership:

W. D. P. Warren.....	Yes 68
	No 1

For Junior Representative:

John H. Pappmeier.....	8
Lee S. Stickler.....	21
Spoiled ballots	1
Total.....	30

Signed:

J. S. CRANDELL, L. C. AUBY, J. W. BRISCOE, *Tellers*
January 17, 1950

GEORGE E. EKBLAW, PRESIDENT FOR 1950

Dr. George E. Ekblaw of Urbana, whose picture appears on the cover of this issue, was inaugurated as President of the Illinois Society of Professional Engineers for the year 1950 at the Annual Meeting in Decatur.

A biographical sketch of Dr. Ekblaw and a summary of his Society activities appeared in the November 1949 issue of this magazine and will not be repeated here. It is sufficient to state that because of his long years of activity in the Society and his thorough understanding of its business, a very profitable year for the Illinois Society of Professional Engineers is anticipated.

MR. LEO SPURLING RECEIVES ILLINOIS AWARD FOR 1949

Upon the recommendation of the Illinois Award Committee and by action of the Board of Direction, Mr. Leo Spurling was granted the Illinois Award for 1949. The presentation was made at the Annual Meeting in Decatur.

The following quotations are from the rules set up by the Board of Direction and from the recommendation of the Committee, respectively.

"The basis of the award shall be for outstanding engineering accomplishment or some exceptional contribution to the engineering profession. This contribution may be in the form of a paper, or unselfish public service.

"The only qualification necessary shall be that the recipient be an engineer of some reasonable degree of professional skill or administrative attainment. It is the intent that this award shall be an honor conferred upon a brother engineer by his fellow-engineers on account of accomplishments or professional contributions which preeminently promote the happiness, comfort and well-being of humanity."

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READ THE ADVERTISEMENTS

SUBSCRIPTION RATES

\$2.00 per year in advance to members of the Illinois Society of Professional Engineers. \$4.00 per year in advance to non-members in U.S.A. and its possessions, Canada, and Mexico. Foreign \$6.00. Single copies 40c.

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"Mr. Spurling, a member of the Illinois Society of Professional Engineers since 1941, has been very active in the affairs of the Society. He was representative of the Society on the Illinois Engineering Council in 1942 and was Chairman of the Council 1943, 1944, 1945, and 1946. He was a member of the Annual Convention Committee in 1944, was Vice-President of the Chicago Chapter in 1944 and was Chapter Representative in 1945 and 1946. Mr. Spurling was a member of the Illinois Society's Legislative Committee in 1943, 1945, and 1946.

"His outstanding work before the 64th General Assembly was instrumental in securing passage of the Illinois Professional Engineering Act. This Professional Engineering Act has been of immeasurable benefit to the Professional Engineers of Illinois and has done much to elevate their profession and to safeguard the welfare of the general public.

"It is for the devotion of great thought and energy to this cause that we recommend Mr. Leo Spurling for this distinguished award."

The 1949 Award Committee consisted of V. E. Gunlock, Chairman, R. E. Gibbs, T. C. Shedd, C. J. Slaymaker, W. B. Walraven, and F. L. Warren.

Following is a list of the recipients of the award since its inception in 1931.

PAST RECIPIENTS OF THE ILLINOIS AWARD

- 1948—State Senator Arthur M. Kaindl for distinguished service to the engineering profession.
- 1947—Col. W. E. Trower, "Comprehensive Flood Control Plan for the Illinois River Basin."
- 1946—V. E. Gunlock, "Chicago Subway System."
- 1945—Alex Van Praag, Jr., "The Small Public Waterworks System, Its Romance and Its Tragedy."
- 1944—S. M. Wood, "Erosion of Our Coastal Frontiers. Part II."
- 1943—A. P. Greensfelder, "The Civil Engineer in War and Post-War Activities."
- 1942—F. L. Osborn, "Engineering Insurance."
- 1941—H. E. Babbitt, "The Flow of Mud and Sludge."
- 1939—S. M. Wood, "Stages of Victoria Nyanza."
- 1938—J. R. Longley, "The Gas Power of Greater Peoria Sanitary District."
- 1937—L. C. Whittemore and N. E. Anderson, "Design of Sewage Treatment Works of the Sanitary District of Chicago."
- 1936—S. M. Wood, "The Cycle of the Great Lakes."
- 1934—A. C. Stanfield, "Some Features of the Flora, Illinois, Water Supply System."
- 1933—M. B. Reynolds and A. E. Gorman, "Chicago's Water Pollution Problem—Past and Future."
- 1932—W. B. Walraven, "Development of Power from Sewage Sludge Gas."
- 1931—W. W. Mathews, "The Galesburg Sanitary District."

COST OF LIVING INDEX

The correction factor to be applied to the I. S. P. E. Schedule of Minimum Fees and Salaries was 167.5 for December, 1949. This factor is based upon the U. S. Department of Labor's most recent Consumer Price Index.

A drop of ink may make a million think — Chinese Proverb.

RECENT GRADUATE ENGINEER AVAILABLE

February, 1950, graduate of Bradley University available. Specialized in mechanical engineering. Student member I.S.P.E. and S.A.E. Address Box B, 204 Civil Engineering Hall, Urbana.

H. E. BABBITT ELECTED SECRETARY-TREASURER

Professor H. E. Babbitt of Urbana is beginning his twenty-sixth year as Secretary-Treasurer of the I.S.P.E. Professor W. A. Oliver of Urbana was reelected National Director and Mr. C. T. Morrisett of Springfield, Alternate National Director to the N. S. P. E., by the 1950 Board of Direction in Decatur.

RANDOM CONVENTION OBSERVATIONS OF A SECRETARY'S SECRETARY

Dean Wm. Everett sending the thought question "Will our cat have kittens?" and being reassured by the mind reader that he would be the proud father of a litter of five. . . . At the Business Meeting Friday, the members being asked the "Question" at 4:55 p.m., Prof. Babbitt exclaiming, "Oh my God, a division!" . . . The joy with which President Whelan banged his brand new gavel. . . . Prof. Babbitt completely speechless Friday night after receiving his watch (just thought his "speechlessness" should go down in some record). . . . The uniqueness of being sung to sleep by a barber-shop quartet—with a pitch pipe. . . . The pre-banquet social gatherings in the various chapter club rooms (shortages of ice cubes but lots of everything else). . . . The friendliness and good fellowship that prevailed throughout the convention. . . . The amazing amount of business that was covered (wish someone would ask me what what the Society does—I'd tell 'em!). . . .

VOX SECRETARII

"The Tumult and the Shouting dies;

The Captains and the Kings depart; . . ."

Kipling might have been writing about the 65th Annual Meeting of the Illinois Society of Professional Engineers at Decatur January 26th to 28th, 1950. The 65th was one of the most noisy but one of the most constructive business meetings of modern times—members came to talk and talk they did.

Of topdrawer interest was the consideration of the report of the Board of Direction on the acquisition of an estate for the Society. Their recommendation to "hold the line" and "carry on," after liberal discussion, was followed. 1949 saw us get to first base, 1950 should see us HOME.

Membership

Total membership hit a new high with 1858 total. The enrollment of Engineers-in-Training was begun during the past year and the applications of Juniors and Students increased which brings young new blood into our ranks. Membership on January 20th after dropping 85

(Continued on page 14)

You are cordially invited to attend the first postwar

I SEE

Illinois Student Engineering Exhibit

presented by

the Engineering Council

and the College of Engineering, University of Illinois

Urbana, Illinois

SEE the new electrical, mechanical, and chemical engineering buildings and the outstanding open house exhibits of the student engineering societies.

Friday, March 10, 2-10 p. m.

Saturday, March 11, 9 a. m. - 6 p. m.

News From Chapters

Capital Chapter

Regular dinner-meeting of the Capital Chapter of the Illinois Society of Professional Engineers convened at "The Mill" at 6 p.m., December 13, 1949.

The meeting was called to order by President Frost. Truman Flatt presented the president with a gavel and appropriate humorous remarks.

Guests and new members were introduced.

Minutes of the last meeting were read and approved.

The President next called for annual reports of the regular committees (copies of the reports attached as a part of these minutes).

The following reports were presented:

Legislation—Theo. Coe

Membership—Harry Cordes

Employment Conditions—L. K. Crawford

Professional Recognition and Practices—J. A. Moore

Publicity and Advertising—A. P. Troemper

Bridges and Highways—Harry P. Graham

Civic Affairs—Arthur C. Kessell

Auditing—Fred R. Zahn (Oral only)

The Auditing Committee's report was unanimously approved.

The following Special Committees reported:

Refresher Course—Lee Stickler

Four Point Program—R. S. Nelle

The president then presented a very informative report of the chapter's activities for the year.

A motion was unanimously adopted that a committee be appointed to prepare and implement the chapter program at the state convention.

Harry Cordes presented the membership certificates to the new members admitted since the last meeting.

The next order of business was the election of officers.

For President: J. P. Murphy

The nominations were closed and the Secretary was instructed to cast a unanimous ballot.

For Vice-President: J. W. Marquardt

G. A. Rehm was nominated from the floor and elected as Vice-President.

For Secretary: L. D. Hudson

Leslie F. Ryburn was nominated from the floor. L. D. Hudson was elected Secretary.

For Treasurer: Arthur C. Kessell

The nominations were closed and the Secretary was instructed to cast a unanimous ballot.

The idea of an Engineer of the Year was presented to the chapter by A. P. Troemper.

A motion was approved that a committee be appointed to prepare a resolution dealing with the Engineer of the Year.

Mr. Magowan presented a suggestion for a joint meeting with the Highway and other engineers.

It was moved that the president accept the suggestion and take steps to plan the meeting.

Forty-four members and guests were present.

J. W. MARQUARDT, *Secretary*

Brief of Capital Chapter Committee Reports

REPORT OF LEGISLATIVE COMMITTEE

Emphasizes the need of a full time Society representative in Springfield during sessions of State Legislature.

"Bills which were of special interest to the engineering profession were bills which were introduced by two different branches of the Architects Association and which, if allowed to pass, would have legislated the professional engineer out of existence. Your committee, with the assistance of other people previously mentioned, were able to get these bills defeated and we feel that on this basis alone, that justification for a regular full-time legislative representative for the Illinois Society of Professional Engineers may be had. This committee wishes to point out that in our opinion the State Society was very poorly represented at all of these hearings and while we are at a loss to understand the State Society's attitude towards such matters, we strongly urge every legal means possible be used to persuade the State Society to interest themselves in legislative matters. The committee wishes to point out that all of them served without compensation and entirely on a voluntary basis and that when the next session of the legislature is opened there will no doubt be another batch of legislation presented which your Society will wish to oppose and that if the State Society is unwilling to assume this responsibility, the Capital Chapter must find some means of looking after the interest of the professional engineers."

REPORT OF MEMBERSHIP COMMITTEE

Report shows an increase in membership from 115 to 187 or 62.6 increase.

REPORT OF EMPLOYMENT CONDITIONS COMMITTEE

"One logical function for the committee might be that of assisting the State Employment Conditions Committee by collecting data and gathering information on a local level, pertaining to activities of the State Committee. During the past year, the activities of the State Committee have been limited due to failure of the State Board of Direction to make decisions on certain policy matters. The local chapter committees have therefore not been requested to participate in any activities of the State Committee."

REPORT OF PROFESSIONAL RECOGNITION AND PRACTICES COMMITTEE

"On the local level, a discussion, concerning the listing under the heading of Engineers in the local telephone directory, was held with Mr. Gause of the R. H. Donnelley Co. Mr. Gause was provided with a copy of the state law and a directory of the registered engineers in this state and promised cooperation. However, considerable part of the directory was in the process of printing and was not corrected.

"In view of this condition, I wrote to Professor Babbitt and suggested that perhaps the rest of the chapters had the same problem and that the Donnelley Company might be contacted by the State Committee and the whole matter handled for all of the chapters. Mr. Babbitt suggested that a letter, over my signature, be sent to all chapters. In my reply to Professor Babbitt, I suggested that while the idea seemed good, if this matter was to be handled in this way, the State Committee chairman was the logical person to write such a letter. I then wrote to the State Committee chairman, Mr. Morgan, sending the complete file and his answer indicated very clearly that neither the State Committee nor the Secretary intended to take any action.

"Thus the round-robin was completed, and it seems that we shall have to forget any hope for state action and take care of our own problem.

"In view of the above, I would suggest that the new committee contact the Donnelley Company before they start work on the new directory."

REPORT OF PUBLICITY AND ADVERTISING COMMITTEE

Usual publicity given to all meetings and activities.

A news story and picture concerning the March 19 meeting were submitted to Professor W. A. Oliver, Editor, ILLINOIS ENGINEER, on March 25. A copy of the letter of transmittal and the news story are attached. This was never published nor was it ever acknowledged. In view of the apparent lack of interest on the part

of the editor of the ILLINOIS ENGINEER in the affairs of Capital Chapter, no further attempt was made by the Publicity and Advertising Committee to furnish material for publication in the ILLINOIS ENGINEER."

REPORT OF COMMITTEE ON BRIDGES AND HIGHWAYS

"As for suggestions for the future of this committee I believe it should be replaced by a committee of State Employees having a representative from each group. Probably there could be two representatives on this committee from the Highway Division; one representing the main offices in the Centennial Building and another representing the group in the offices at Second and Ash (the district, Research Materials, etc.)."

REPORT OF CIVIC AFFAIRS COMMITTEE

Study of garbage disposal in Springfield was made and a report submitted to the city council and other interested groups. Suggests that a study of street lighting would be a profitable project not only in Springfield but throughout the State.

REPORT ON REFRESHER COURSE COMMITTEE

Reports on course offered by University of Illinois to those who were planning to take the December 8 and 9, 1949, Professional Engineering Examination. Chapter active in promoting the course in the Springfield area.

COMMITTEE ON POINT FOUR LEGISLATION

In general Capital Chapter favored the legislation.

REPORT OF THE PRESIDENT, A. M. FROST

Speaks in general of a very successful year in Capital Chapter activities, re-emphasizes the Chapter's activities during the session of the State Legislature.

"Our opposition to the Society headquarters building was carried on with vigor. A committee was empowered to study and report on, advantages of locating such a building in Springfield if one was to come into being. We were told, at first that no specific location had been determined but that the activity was more in the nature of exploring the idea of erecting such a building. As the 'exploring' continued, we were to learn that Champaign had been picked as the location and that considerable spade work had been done towards acquiring a burned-out tavern and that a sale of bonds to Society members was to be proposed as a means of financing the project. It was our considered judgment that acquiring a building by any means should be deferred until the Society had gained considerably more than 10% of eligible members which it then had. A Chapter delegation attended a Board meeting; a frank letter of opposition was written to, and published by, the ILLINOIS ENGINEER; we sought to gain support from other Chapters by writing all Chapter presidents; our representatives opposed it at every Board meeting.

At first it appeared that we were winning some help but, on the final Board vote setting the project in motion, only one other chapter supported Capital in its negative vote. While the entire \$50,000.00 bond issue has not been sold, a sizable amount has been subscribed to by a minority of Society members. The building as planned was to be completed this month but, at this writing, nothing has been done due to legal difficulties between the owner and the tenant who occupied the building at the time of the fire.

Ambraw Chapter

The regular meeting of the Ambraw Chapter of the Illinois Society of Professional Engineers was held at Wayne's Restaurant in Olney on December 15, 1949, with President K. W. Porter presiding.

(Continued on page 11)

STATE OF ILLINOIS
DEPARTMENT OF REGISTRATION AND EDUCATION
DIVISION OF PROFESSIONAL ENGINEERING

Examination for Registration

Part I

Thursday, December 8, 1949

8:30 A.M. to 12:30 P.M. at Chicago

8:00 A.M. to 12:00 Noon at Urbana

Answer seven but no more than seven of the following questions. If more than seven questions are answered only the first seven will be considered.

EXAMINATION FOR REGISTRATION OF
PROFESSIONAL ENGINEERS

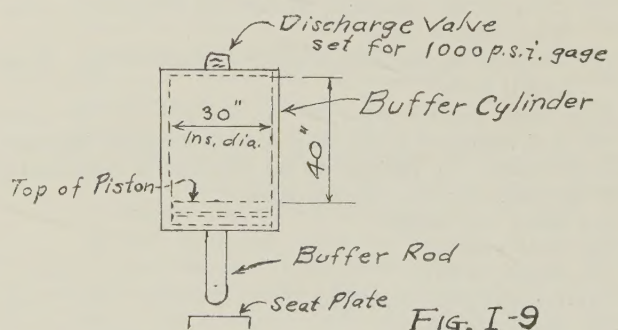
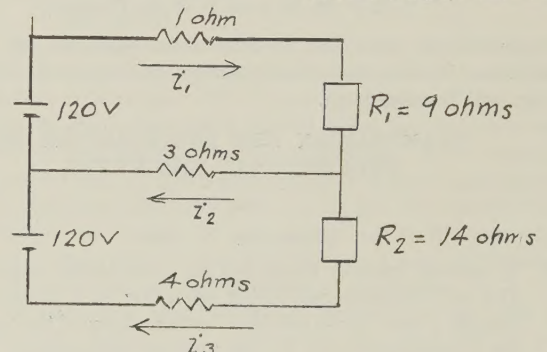
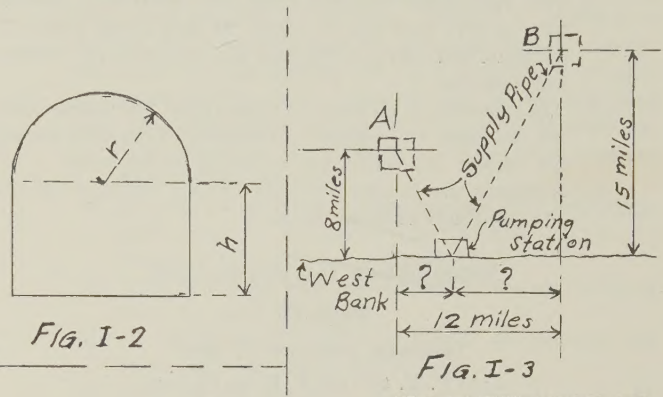
Part I

December 8, 1949

- Given the curve of $y = 6 + x^2 - \frac{x^3}{10}$ and the line $y = \frac{6x}{10}$
 - Plot the curve and the line in the interval $(-3 \text{ to } +11)$.
 - Calculate the area between the curve, the line and the Y axis.
 - Find the distance from the Y axis to the centroid of the area found in (b).
- A tunnel is to be constructed the cross section of which is to be in the form of a rectangle surmounted by a semicircle as shown in Fig. I-2. In order to make the most effective use of available lining material the inside perimeter of the cross section must be kept at 60'. Determine the radius "r," and height, "h," which will give the greatest area of cross section for the given perimeter.
- Two towns A and B (see Fig. I-3) are both located on the west side of a river from which it is proposed that each secure a water supply. Town A is 8 miles from the bank while town B is 15 miles from the bank and 12 miles upstream with respect to town A. The river is straight between the towns. It is proposed that a single pumping station serve both towns. Determine:
 - The position of the pumping station on the bank that will make the total length of supply pipe the least and
 - The total length of supply pipe.
- A train traveling at 75 miles per hour receives a warning that it is approaching a "slow signal" and the engineer immediately reduces speed at a uniform rate of 1.8 feet per sec. per sec., so that his speed is 15 m.p.h. as he reaches the slow signal. The slow order covers a stretch of 5 miles of track being reconstructed and as soon as he reaches the end of the slow order the engineer increases his speed at such a uniform rate that the train is traveling 85 m.p.h. 90 seconds thereafter.
 - What length of time elapsed between the warning and the beginning of the slow order stretch and what distance did the train travel during that time?
 - What distance did the train travel from the end of the slow order stretch in attaining its speed of 85 m.p.h.?
 - How long will the train have to travel at 85 m.p.h. in order to make up the time lost by not running continuously at 75 m.p.h.?
- Compute the currents i_1 , i_2 , i_3 , of Fig. I-5.
- A man owns two square lots of unequal size, together containing an area of 15,025 sq. ft. If the lots were continuous it would require 530 feet of fence to embrace them in a single enclosure of six sides. Find the area of each lot.
- An electric truck is propelled by a d-c motor drive connected to a 110-volt storage battery. The truck is required to exert a tractive effort of 200 pounds at a speed of 5 miles per hour. If the overall efficiency of motor and drive is 70% what is the current taken from the battery?
- A cylindrical tank with flat ends has an inside diameter of 2 feet. What inside length must it have to store 20 pounds

of dry air at 70 pounds gage pressure and 70°F.? If the temperature rises to 90°F. what will be the gage pressure?

- Figure I-9 shows diagrammatically a pneumatic buffer on a lift bridge. As the bridge starts to lower the buffer piston is in the position shown and the air in the cylinder is at atmospheric pressure and temperature (60°F.). Neglecting heat loss to the atmosphere:
 - At what length of piston travel will the discharge valve open?
 - What will be the temperature within the cylinder at the instant the discharge valve opens?



- An automobile is moving at a constant speed of 40 m.p.h. up an incline, which has a slope of 6 vertical to 100 horizontal, when one front wheel comes off. The wheel and tire together weigh 50 pounds. Neglecting friction and air resistance:
 - How far will the wheel roll up the incline?
 - How long will it take the wheel to roll that distance?
- To heavily insulated tanks A and B contain dry air and are connected by a pipe containing a release valve set for a gage pressure of 50 pounds per sq. inch. Tank A has a volume 400 cubic feet and tank B a volume of 600 cubic feet. Each tank shows a gage pressure of 10 pounds per sq. in. and a temperature of 50°F. when the release valve in the connecting pipe is set. The air in tank A is then heated until the release

valve opens. Neglecting loss of heat to the atmosphere:

- (a) At what temperature of the air in tank A will the valve in the connecting pipe release?
 - (b) What will be the pressure and temperature in each tank when air stops flowing from tank A to tank B? When the valve in the connecting pipe once releases it offers no further resistance to free passage in either direction until reset.
12. Circle the term that best completes the statement.
- (a) The roasting of an ore usually results in the formation of a metallic (1) carbide (2) carbonate (3) oxide (4) sulfide
 - (b) Oxygen is prepared commercially from (1) mercuric oxide (2) potassium chlorate (3) liquid air (4) ozone
 - (c) Two substances obtained from the destructive distillation of soft coal are (1) coal tar and acetic acid (2) methanol and coal gas (3) coke and ammonia (4) acetone and benzene
 - (d) The neutrons in an atom (1) determine the atomic number (2) equal the number of electrons (3) revolve around the nucleus (4) contribute no charge to the atom
 - (e) Ammonia gas is approximately (1) 1.7 (2) 22.4 (3) .57 (4) .94 times as dense as air.

Examination for Registration

Part II

Thursday, December 8, 1949

1:30 P. M. to 5:30 P. M. at Chicago

1:00 P. M. to 5:00 P. M. at Urbana

Answer any seven but no more than seven of the following questions. If more than seven questions are answered only the first seven will be considered.

EXAMINATION FOR REGISTRATION OF PROFESSIONAL ENGINEERS

Part II

December 8, 1949

1. A machine member which has the cross section shown in Fig. II-1 will be subjected during operation to a thrust of 24,000 lbs. or a pull of 36,000 lbs., acting along a line parallel to the longitudinal axis of the member and through the point indicated on the figure.
 - (a) Calculate the maximum intensity of compressive stress. Where does it occur?
 - (b) Calculate the maximum intensity of tensile stress. Where does it occur?
2. A d-c shunt motor is rated 100 h.p., 600 volts, at 1200 r.p.m. The field resistance is 400 ohms and the armature resistance is 0.22 ohms. The efficiency of the motor at its rated load is 90 per cent. At rated load determine:
 - (a) Rated line current
 - (b) Field current
 - (c) Counter E.M.F.
 - (d) Internal power developed
 - (e) Internal torque
 - (f) Torque at the pulley.
3. In a test of a centrifugal pump driven by an electric motor, the suction pipe is 10 inches in diameter and its gage indicates a partial vacuum of 2.5 feet of water. The discharge pipe is 5 inches in diameter, is 2 feet higher than the suction gage and shows a pressure of 50 feet of water. If the pump is discharging 1.6 cubic feet per second and the electrical power input is 12 kw, what is the efficiency indicated?
4. A crank 6 inches long rotates counter clockwise at a constant speed of 30 r.p.m. A link 24 inches long connects the crank to a slider, at the right of the crank, which operates on a horizontal guide 12 inches above the center of the crank. Designate the extreme left position of the slider as "A" and the extreme right position as "B."

- (a) What is the length of travel of the slider between "A" and "B"?
 - (b) How long does it take the slider to move from "A" to "B"? From "B" to "A"?
 - (c) Where is the slider when it has its maximum velocity? Which way is it moving? What is its velocity at that instant?
5. A small plant takes 450 kw at 2300 volts, 3 phase, 60 cycles at a power factor of 0.6 lagging current. Neglecting machine losses,
- (a) Determine the kva rating of a synchronous condenser necessary to bring the plant power factor to unity.
 - (b) It is desired to replace the synchronous condenser with a synchronous motor capable of taking an additional load of 200 kw. Determine the kva rating of the motor necessary to carry the added load and at the same time raise the plant power factor to unity.
6. A trapezoidal channel to carry irrigation water at the rate of 3500 cubic feet per second is to be cut through a sandy soil. The bottom of the canal is to be 100 feet wide and the side slopes are to be $1\frac{1}{2}$ horizontal to 1 vertical. The water is to be 15 feet deep. What will be the required slope of the water surface?
7. A column to support a load of 250 kips is in turn to be supported at the center of three parallel beams of equal length 24 feet center to center of bearings. The middle beam is to be a 30" WF at 172 lbs. The outer beams are to be 24" deep. The column is to be supported on the beams by a steel bil which is to be assumed to be rigid. The intensity of the stress is not to exceed 20 kips per sq. in. What weight beams should be used for the outside members? Figure II-7 illustrates the arrangement of members.

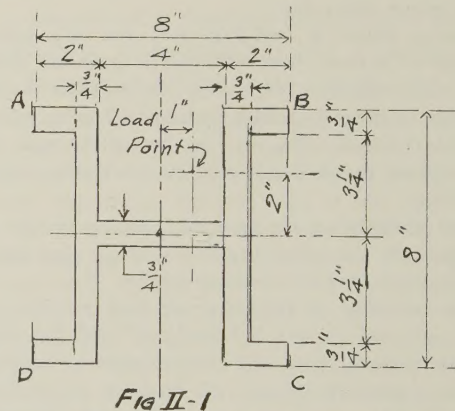


Fig II-1

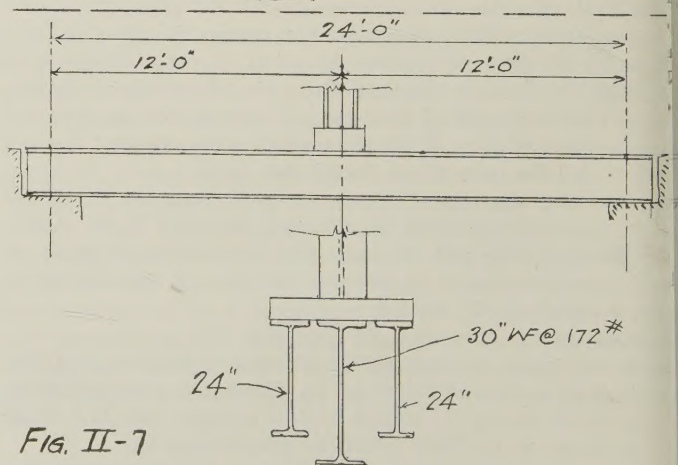


Fig. II-7

ENLARGED CROSS SECTION

8. Calculate the torque in pound-feet produced by a pressure of 250 lb. per sq. in. on a 3.5-inch diameter piston when the crank is 45° past top center. The connecting rod is 10 inches long and the stroke is 4 inches.

1. A 10-h.p., 220-volt, 60-cycle, 3-phase, wound-rotor induction motor is delivering rated load at 757 r.p.m. The rotor resistance per phase is 0.14 ohm. Determine the speed if the rotor resistance is three times as great, assuming constant torque.
2. A culvert 4 ft. wide and 6 ft. deep passes through an embankment. An inclined gate of symmetrical design is set at a slope of one horizontal to two vertical so that water behind the embankment tends to close the gate which seals the culvert. The gate weighs 2000 lb. and is hinged at its upper end. What is the torque required about the hinge to swing the gate upward when water in the culvert is 5 ft. deep and water behind the embankment is 10 ft. deep?
3. A diesel engine of the air-cell type has a cylinder bore of $4\frac{1}{4}$ in. and a stroke of 6 in. Assuming flat surfaces for both piston face and cylinder head, calculate the distance in inches between these two surfaces under the following conditions: pressure at end of compression 500 lb. per sq. in. (absolute); pressure at beginning of compression 13.7 lb. per sq. in. (absolute); volume between piston and head 30 per cent of the total clearance volume, 70 per cent being in the air cell.
4. A truck weighing 5 tons carries a load of 10 tons. The motor develops a torque of 400 lb.-ft. The driving wheels are 42 in. in diameter. The differential ratio is 5 to 1. The efficiency of the differential gears is 95 per cent. The tractive effort on a level road at 10 mi. per hr. is 700 lb. What ratio is necessary in the transmission to climb a 10 per cent grade at the same speed?
5. (a) Which alloy has a better castability, a solid solution or an eutectic alloy? Why?
(b) What is the effect of cold working on the mechanical properties of a metal or alloy?
(c) What are the two steel making processes which produce most of the steel made in this country and what are some typical applications of each of these steels?

Examination for Registration

Part III

Morning

Friday, December 9, 1949

8:30 A. M.

Answer two, but no more than two questions from Group A-1: if more than two questions are answered from Group A-1 only the first two answered will be considered.

Answer three questions from Groups B-1, C-1, D-1, and E-1: if more than three questions are answered only the first three will be considered. Questions may be taken from any group or any combination of groups.

NOTE: Use a separate examination book for each group from which you choose a question.

EXAMINATION FOR REGISTRATION OF PROFESSIONAL ENGINEERS

Part III, Group A-1

Friday Morning, December 9, 1949

- A-1, 1. Your superior has given you the assignment to locate all published information on possible methods of measuring accurately the level of a liquid under pressure within a vessel, under conditions where it is not desired to use a gage glass or other transparent device. State briefly how you would proceed and what sources you would investigate. Outline the form of report you would make to your superior.
- A-1, 2. A piece of untreated timber costs \$1.25 in place, with an expected life of seven years. A treated timber costs \$2.10 in place. Find the increase in life which treatment must secure to justify its cost if the rate of interest is 5%.
- A-1, 3. A company wishes to accumulate \$10,000 in ten years by making uniform annual payments into a sinking fund.

During the first four years, the company was able to invest the funds in the sinking fund with an average return of 3% per annum. However, after the fourth year average interest earnings dropped to $2\frac{1}{2}\%$. Determine the annual payment which the company must make after the fourth year, assuming that $2\frac{1}{2}\%$ per annum will be earned during the remaining years.

Part III, Group B-1

Friday Morning, December 9, 1949

- B-1, 1. Cold winter air at 20°F ., 760 mm. pressure, and 70% humidity is conditioned by passing through a bank of steam-heated coils, through a water spray, and finally through a second set of steam-heated coils. In passing through the first bank of steam-heated coils, the air is heated to 75°F .. The water supplied to the spray chamber is adjusted to the wet bulb temperature of the air admitted to the chamber, hence the humidifying unit may be assumed to operate adiabatically. It is required that the air emerging from the conditioning unit be at 70°F . and 35% humidity.
 - (a) What should be the temperature of the water supplied to the spray chamber?
 - (b) In order to secure air at the required final conditions, what must be the percentage humidity of the air emerging from the spray chamber?
 - (c) What is the dry bulb temperature of the air emerging from the spray chamber?
 - (d) On the basis of 1 cu. ft. of outside air, calculate the volume of each step of the process.
 - (e) Calculate the pounds of water evaporated per cu. ft. of original air.
- B-1, 2. A flat vertical surface is at a temperature of 500 deg. F., and the resistance to heat flow to the surface is nil. The surface is insulated with 1 inch of insulation, but it is thought that considerable heat is being lost from the surface of the insulation to the atmosphere, which averages about 70 deg. F. The insulation has a thermal conductivity of 0.040 Btu/(deg. F.) (ft.) (hr.). The heat transfer coefficient for the air film at the surface of the insulation is 4.0 Btu/(deg. F.) (sq. ft.) (hr.) and may be assumed to be constant for any thickness of insulation.

If insulation costs \$0.40 per square foot per inch of thickness installed and heat loss is at a cost of \$0.50 per 1,000,000 Btu, what should the thickness of insulation be if the insulation is amortized in 4 years? The thickness should be based on operation 24 hr./day for 365 days/yr. Insulation is available as boards of 1-inch thickness.
- B-1, 3. The main reaction for the production of blue water gas containing 48 per cent H_2 , 42 per cent CO , 5 per cent CO_2 , and 5 per cent N_2 is presumed to be: $\text{C} + \text{H}_2\text{O} > \text{CO} + \text{H}_2$.
 - (a) Compute the heat absorbed in the production of the actual blue water gas, per pound of carbon consumed. Assume that the reaction takes place at 20°C .
 - (b) How much heat would be absorbed per pound of carbon consumed if the reaction took place at 1000°C ?
- B-1, 4. An evaporator (single effect) is removing 500 lb./hr. of water from a colloidal suspension which deposits scale on the steam chest. During one 8-hour shift each week it is cleaned which increases the overall heat transfer coefficient from 50 to 225. Assuming that the scale is deposited uniformly throughout the week and none flakes off, calculate:
 - (1) The mean heat transfer coefficient for the week.
 - (2) How often should the evaporator be cleaned for maximum capacity?

Part III, Group C-1

Friday Morning, December 9, 1949

- C-1, 1. A municipal sewage treatment works, to be designed to serve an ultimate population of 16,000, is to include secondary treatment by the conventional trickling filter process. The average daily per capita sewage flow is 100 gal-

lons, and the raw sewage has a strength of 300 parts per million 5-day Biochemical Oxygen Demand (B.O.D.). Removal of B.O.D. by the primary settling units is assumed to be 35 per cent.

- With an allowable filter loading of 600 pounds of B.O.D. per acre foot per day, and a filter depth of six feet, how many square feet of filter area will be required?
- If two equally-sized filter units were used, what would be their diameters?
- What is the average daily rate of flow applied to the surface of the filter in million gallons per acre per day?
- What general size filter stone would you recommend for the major upper portion of the filter?

C-1, 2. Find the dimensions of a canal carrying water, with the following data given. The nearest whole number will be accepted.

Quantity of flow = 800 C.F.S.
 Velocity = 5 F.P.S.
 Slope = 0.0004
 Side slope of canal = 1.5:1
 Bottom width = 25 ft.
 Value of n (coefficient of roughness) = 0.014
 Use Manning's formula, $V = \frac{1.486}{n} R^{2/3} S^{1/2}$
 Where R = the hydraulic radius
 $Q = AV$.

- C-1, 3. (a) Define "free-haul limit" and "overhaul."
 (b) Give the uses of a mass diagram for earth work.
 (c) In the mass diagram for a highway, a part of which is shown in Fig. C-1, 3, the material between stations 0 and 20 is to be balanced. The specifications call for payment to be made to the contractor for only that portion of haul beyond the free-haul limit of 1000 ft. Determine the actual amount of overhaul in yard stations (1 yd. sta. = 1 cu. yd. hauled 100 ft.) for which the contractor should be paid.

C-1, 4. Figure C-1, 4 shows diagrammatically a derrick car erecting a plate girder. The derrick car and its equipment (exclusive of boom) weighs 60 tons and its center of gravity is 25' to the rear of the mast. The boom weighs 2 tons and its center of gravity is at the center of its length. The girder being placed weighs 40 tons and as indicated its center of gravity is 40 feet forward of the mast when fully boomed out.

- Will hold down clamps be required? If so what will be the pull in them if they are placed at the center of the rear truck?
- What will be the reaction on the forward truck?
- What will be the stress (total) in the boom?
- What will be the stress (total) in the mast?

Part III, Group D-1

Friday Morning, December 9, 1949

D-1, 1. A distribution transformer bank consisting of three 50-kva single-phase transformers is connected wye-delta with the primary neutral isolated. Each transformer has a resistance of 1.4% and a reactance of 2.5%. The following load is connected:

60 kw at 80% power factor, balanced three phase
 45 kw at 95% power factor, single phase, connected to one pair of secondary leads.

- Assuming a constant voltage primary supply, determine:
- Load on each transformer
 - Per cent regulation on each transformer.

D-1, 2. Give the information required in (a) for each of the general types of vacuum tube listed in (b).

- Information Required
- (1) Type of tube (Vacuum or Gas)

MASS DIAGRAM

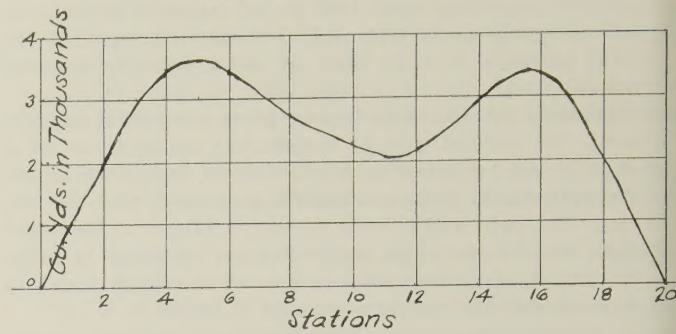


FIG. C-1, 3

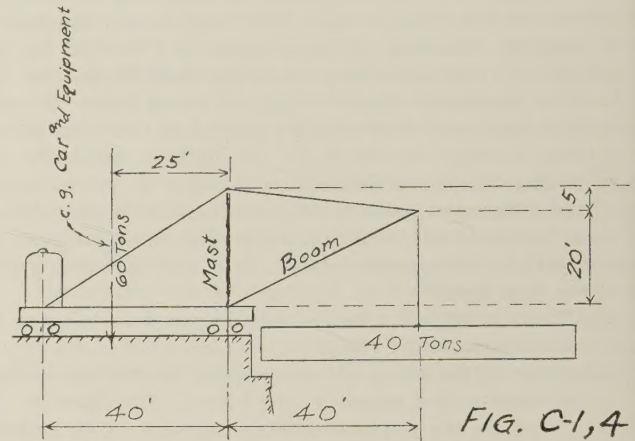


FIG. C-1, 4

- Process of emission (Thermionic, Photoelectric etc.)
- Kind of discharge (Townsend, Glow, Arc, etc.)
- Unit of Anode Current (Ampere, Milliampere, Microampere)
- Principal application (Radio, Television or Radar transmitters or receivers, controlled rectifiers, h.f. oscillators, welding control, smoke detection, etc.)
- Name of Tube
 - Receiving type triode
 - Receiving type pentode
 - Magnetron
 - Klystron
 - Kinescope
 - Thyratron
 - Ignitron
 - Rectigon or Tungar
 - Iconoscope
 - Voltage Regulator.

D-1, 3. Explain in steps how to align a radio receiver to be used for the reception of both standard and short-wave amplitude modulated programs.

D-1, 4. The grid of a thyratron tube is so biased that the plate circuit will conduct current when the plate emf is positive and 50 volts or more. If a sinusoidal emf of 100 volts (rms) is applied in series with a 200-ohm resistor to the plate circuit of the tube, calculate the maximum value of the plate current. Assume that the arc drop in the tube is constant at 15 volts. Sketch the shape of a cycle of the plate-current wave and the anode voltage of the thyratron in time-phase relationship.

Part III, Group E-1

Friday Morning, December 9, 1949

E-1, 1. Design a train of spur gears by means of which a shaft rotating at 2400 r.p.m. may drive a shaft at 110 r.p.m. (with a maximum deviation of $\pm = 0.10$ r.p.m.). The driving and driven shafts rotate in opposite directions and

no idler is used. Gears are to be chosen from the stock list given below, the speed ratios of the successive pairs are to be as nearly equal as possible and minimum gear sizes are to be used as far as possible.

Stock list: every integer from 12 to 20 teeth, alternate integers from 20 to 90 teeth, also 94, 96, 100, 108, 112 and 120 teeth.

2. A turbine-generator delivering 36000 kw has a combined engine efficiency (over all) of 79%, the initial steam conditions being 480 psi absolute and 760°F. and the exhaust pressure 1.5 inches Hg. absolute. The generator efficiency is 95%, and it can be assumed that all turbine losses appear in the exhaust steam. The steam velocity in the supply pipe and in the exhaust connection between the turbine and the condenser is 12500 feet per minute. Determine the following:
 - (a) Steam flow to turbine pounds per sec.
 - (b) Heat that must be removed in the condenser expressed in Btu per pound of steam.
 - (c) Area (sq. ft.) required in steam supply pipe and in exhaust connection.
3. Define and describe the following methods of heat treatment. List the effect of each on ductility, modulus of elasticity, tensile strength, elastic limit, and internal stresses when applied to high carbon steel: (a) full annealing, (b) normalizing, (c) stress relief annealing, (d) hardening, (e) tempering.
4. A factory building 500 feet long, 200 feet wide, and 25 feet high is to be ventilated. Office section is 200 feet long, 25 feet wide, and 20 feet high. Fan room is 20 feet long, 15 feet wide, and 10 feet high. Air changes per hour: Office 15, Factory 5, Fan Room 0. Ductwork resistance is 0.75 inches, airfills 0.2 inches, heating coils 0.3 inches.
 - (a) Calculate the required fan capacity CFM.
 - (b) Calculate the fan air horsepower.
 - (c) Calculate the motor brake horsepower @ .65% static efficiency.
 - (d) Diagram of system, show intake and outlet.

Examination for Registration

Part III

Afternoon

Friday, December 9, 1949

1:30 P. M.

Answer two, but no more than two questions from Group A-2: more than two questions are answered from Group A-2 only the first two answered will be considered.

Answer three questions from Groups B-2, C-2, D-2, and E-2: more than three questions are answered only the first three will be considered. Questions may be taken from any group or any combination of groups.

NOTE: Use a separate examination book for each group from which you choose a question.

EXAMINATION FOR REGISTRATION OF PROFESSIONAL ENGINEERS

Part III, Group A-2

Friday Afternoon, December 9, 1949

1. The development of mine-mouth steam power plants for the generation of electric energy has been proposed as a means of saving transportation cost of fuel. Discuss the feasibility of this plan.
2. Discuss the advisability of including the following in a construction contract: (a) sequence of work, (b) method of performing work, (c) quality of work.
3. A pumping plant of 5000 gallons per minute capacity delivers water against a head of 150 feet with an efficiency of 70% at full load and 40% efficiency at half load. The

plant cost \$4,000 installed. The power costs one cent per kwh, and fixed charges are 12% of the first cost. The plant operates at full load for 3,000 hours per year and at half load for 2,000 hours per year. Find the total annual cost of operation and also the cost per million gallons pumped.

Part III, Group B-2

Friday Afternoon, December 9, 1949

- B-2, 1. Five large storage tanks to hold crude phosphoric acid (resulting from the extraction of phosphate rock, containing calcium fluoride) are to be constructed.
 - (a) What material should be used for the tanks?
 - (b) How should they be fabricated?
 - (c) Would clad material be suitable for this application?
 - (d) What tests should be applied to determine the suitability of a finished tank?
 Give reasons for all answers.
- B-2, 2. Coal that has the following proximate analysis is being burned in a grate-fired furnace:

	Wt. %
Moisture.....	3.0
Volatile Combustibles.....	27.0
Fixed Carbon	63.0

The total carbon content of the coal is known to be 78.0 percent by weight. The refuse is removed from the ashpit and wetted down to facilitate handling. A sample of the ash analyzed as follows:

	Wt. %
Moisture.....	30.0
Fixed Carbon.....	15.0

The Orsat analysis of the flue-gas was as follows:

	Vol. %
Carbon Dioxide.....	14.0
Oxygen.....	5.0

- (a) What percentage of excess air was used?
- (b) What percentage of carbon was burned?
- (c) How much coal is consumed per 100 moles of dry flue gas?
- B-2, 3. Nitric acid is ordinarily manufactured from ammonia by the Ostwald process.
 - (a) Give all reactions involved.
 - (b) Describe the catalyst and give its operating temperature and pressure.
 - (c) Give a process flow sheet and indicate the materials of construction for each major piece of equipment.
 - (d) List the engineering data you would have to obtain before designing the concentrating unit to make 90% acid.
- B-2, 4. A concentric tube heat exchanger with steam in the jacket at 220°F. and nitrogen gas entering at 20°F. and leaving at 160°F. in a 1 inch O.D. 10BWG tube under a pressure of 150 psig. What percentage change would there be in the length if the diameter were cut in half? If it were doubled?

Part III, Group C-2

Friday Afternoon, December 9, 1949

- C-2, 1. An industry discharging its process wastes into an adjacent river is causing stream pollution. Surveys of both the stream and the industrial effluent have furnished the following data:

Average dry weather flow of the stream	= 100 c.f.s.
Average dry weather B.O.D. of stream above industry outlet	= 3 p.p.m.
Rate of flow of industrial effluent	= 1000 g.p.m.
B.O.D. of industrial effluent	= 500 p.p.m.

 In order to abate the stream pollution, it will be necessary for the industry to provide a treatment works for its wastes. It has been determined that an average B.O.D. under dry weather flow conditions of 5 p.p.m. will be al-

lowable in the stream below the outlet sewer of the industry. The treatment works must be designed to produce these stream conditions.

- (a) What B.O.D. in parts per million will be allowable in the treatment works effluent?
- (b) What removals in terms of pounds B.O.D. per day must be obtained by the treatment works?
- (c) What will be the population equivalent of the treatment works effluent?

Indicate all computations.

- C-2, 2. The P.I. on the center line of a rural highway is at Station 57+10 and $\Delta = 67$ degrees. A pavement 20 feet wide is to be constructed. The maximum radius that can be obtained is 290 ft., measured to the center line of the pavement at the P.C. and P.T. Design the curved section of the highway, showing curvature and superelevation. Show side slopes to be used on drainage ditches which are to be 2 feet deep. Assume that the topography is quite level. State maximum speed for which you designed superelevation.

- C-2, 3. A high school has a concrete swimming pool, capacity of 60,000 gallons, which it operates as a fill-and-draw type pool. It has a hopper bottom and the walls are straight, vertical from the bottom to the edge of the walks which surround the pool. The State Health Dept. has warned the school board that the pool is being operated in violation of the State Swimming Pool Law and that a recirculation-filtration system will have to be provided before the next school term. The maximum allowable filtration rate is 3 g.p.m. per square foot. The recommended backwash rate is 15 g.p.m. per square foot. According to the minimum sanitary requirements, the turnover should not exceed six hours.

- (a) How much sand filter area should be made available to meet state requirements?
- (b) What should be the capacity of the recirculation pump in g.p.m.?
- (c) Will it be necessary to supply another pump for backwashing purposes? Give computations for proof.

- C-2, 4. An elevated water tank is supported on a reinforced concrete raft footing 45 feet square which in turn is supported on piles. The piles are driven in eleven rows in each direction (121 piles in all) the rows are 4'-0" apart in each direction and are arranged symmetrically about the center of the footing which coincides with the center of the tank. The tank has a capacity of 600,000 U.S. gallons and weighs (including columns and bracing) 750,000 lbs. The footing contains 220 cubic yards of reinforced concrete which is distributed symmetrically about the center of the footing. The maximum total wind pressure on the tank and its supports may be assumed as equivalent to a single force of 80,000 lbs. acting through the vertical center line of the tank in any horizontal direction in a plane parallel to, and 125 feet above, the base of the raft footing. Assume that the raft footing is rigid enough to produce planar distribution of pressure over the pile group and calculate:

- (a) The maximum pressure on any pile
- (b) The minimum pressure on any pile

Part III, Group D-2

Friday Afternoon, December 9, 1949

- D-2, 1. The control room in a generating station is 40 X 100 feet. Vertical instrument panels are 22 feet apart with 30-inch high control benchboards between. It is desired to maintain 50 f.e. at the benchboard level. A louverall ceiling will be installed 12 feet above the floor, with lamps 3 feet higher in the lighting cavity and accessible only from below. The room will be ventilated.
- (a) Specify reflectance factors for ceiling, walls, panel surfaces, and floors.

- (b) What will be the approximate initial foot candle?
- (c) Select a type of lighting from the following given reasons for your choice: Incandescent, standard fluorescent, slimline fluorescent, cold cathode.
- (d) If the supply is 208-volt, 4-wire, how would switch the lamps.

- D-2, 2. A used 3-phase, 60-cycle, 4,000-volt, 800-hp wound-rotor induction motor, with controller and resistors, is available. Outline the inspections and preliminary no-load tests would make before accepting this equipment in order to insure that it would have a reasonable service life. State the object of each test and inspection, and give the standard by which you judge the results.

- D-2, 3. A receiving-type power triode is operated at a grid bias -50 volts and at a plate potential of 225 volts. The triode which is coupled to the plate circuit by means of an impedance transformer, is equivalent to a pure resistance of 3,000 ohms in the plate circuit. When the tube is operated at maximum output, the plate current varies from 0.110 amp to 0.010 ampere and the zero signal current is 0.050 amp.

- (a) Calculate the power output, the percentage of second harmonic distortion, and the power dissipation in the plate.

- (b) Assuming that the tube is delivering maximum power output, what is the plate resistance of the tube?

- D-2, 4. An industrial plant has a peak load of 548 kva at 74 per cent lagging power factor. The power rate schedule includes a demand charge of \$1.25 per kva per month. How many kva of capacitance is required to improve the power factor to 92 per cent lagging? How much would the capacitors reduce the annual demand charges? If capacitors cost \$18.00 per kva installed, what is the return on the investment in capacitors?

Part III, Group E-2

Friday Afternoon, December 9, 1949

- E-2, 1. Design a helical spring of round steel wire, ends closed and ground square, that will safely carry a load of 500 lbs. when closed, with a stress not to exceed 125,000 lbs. per sq. in. and a scale of 150 lb. per in. deflection. The proportions are to be as follows:

$$\frac{\text{Length closed}}{\text{Mean diam. of coil}} = 1.7 \text{ to } 2.3 \quad \frac{\text{Mean diam. of coil}}{\text{Diam. of wire}} = 6 \text{ to } 10$$

- E-2, 2. The gap in a punch press is 36 inches from centerline of punch to inside of frame. Cross section of frame is rectangular whose width = 18 inches, depth = 24 inches, thickness = 2 inches. The frame material is built-up plate. If maximum stress is limited to 20,000 lb. per square inch, how large a force can be safely exerted by the punch press?

- E-2, 3. A centrifugal boiler feed pump is to be selected for a boiler-turbo-generator plant. Drum pressure is 950 lb. gage. Boiler has a rating of 250,000 lb. steam per hour. A margin of 25% on pressure developed and a 20% margin on capacity is necessary. Water is 300F (sp. gr. 0.92).
- (a) What style of pump would you recommend
 - (b) Pump speed
 - (c) Pump rating in GPM
 - (d) Brake horsepower if pump efficiency is 72%
 - (e) Allowing a margin of 10% give nearest commercial motor size

- E-2, 4. An auditorium seating 1800 people is to be maintained at 78°F dry-bulb and 67°F wet-bulb temperature when outdoor air is 90°F dry-bulb and 75°F wet-bulb. The heat amounts to 120,000 Btu per hour. Determine
- (a) Outdoor air required for ventilation
 - (b) The volume of conditioned air at 65°F dry-bulb must be circulated to carry total sensible heat load
 - (c) The wet-bulb temperature of the conditioned air to absorb the moisture

NEWS FROM CHAPTERS

(Continued from page 4)

dinner was served at 6:30 p.m., and the meeting called order at 7:30 p.m. The following members and guests were present:

Members—B. P. Johnson, C. P. Mathy, H. S. Bateman, E. Hedgecock, C. W. Lyons, D. R. Connor, Jr., C. H. Mey, K. W. Porter, H. K. Dolbow, A. V. Marbry, R. J. Pfeiffer, H. F. Gregory, E. S. Organ, G. W. Henderson, L. Warren, J. W. Henline, D. R. Connor, Sr. Guest, Thos. P. Burke.

The minutes of the meetings of March 23, and October 1949, were read and approved.

It was moved by Lyons and seconded by Henline that the following bills be allowed:

L. L. Brissenden, expenses of meeting 10/26/49	\$13.00
L. K. Dolbow, Film Postage.....	1.34
Mary Flack, Stenographic Services.....	5.00

The motion carried.

Inasmuch as this was the last meeting of the year, President Porter called for a report of all committees. The report of the Secretary and Treasurer was read and approved.

This was followed by a report of the Ethics and Practice Committee and Mr. Johnson, Chairman, was directed to obtain copies of the Code of Ethics for all members.

Mr. Brissenden, Chairman of the Program Committee, and Mr. Walters, Chairman of the Membership Committee, were unable to be present. However, a written report of the activities of the Membership Committee was submitted by Mr. Walters.

As no other committees with the exception of the Nominating Committee had any reports to make, President Porter gave a short talk extending to the Chapter his appreciation for the cooperation of each and every member during his term of office as President.

President Porter then appointed Mr. Hedgecock and H. S. Bateman to audit the books of the Treasurer before being turned over to the Treasurer for the ensuing year. This was followed by President Porter asking for a report from the Nominating Committee for their nominations for officers for 1950.

C. W. Lyons reported the following members who had been nominated by the committee:

President—Dewey R. Connor, Sr.

Vice-President—B. P. Johnson

Sec.-Treas.—R. B. Walters

Chapter Representative—John Henline

It was moved by Wiley and seconded by Dolbow that the nominations be closed and that the Secretary be authorized to cast a unanimous ballot for all officers nominated. The motion carried.

It was moved by Wiley and seconded by Warren that the next meeting be held on February 9. The motion carried.

This was followed by a discussion of the annual meeting to be held in Decatur on the 26th, 27th, and 28th of January and it was moved by Warren and seconded by Marbry that the Chapter Secretary be directed to write

to the State Secretary requesting that he write to Mr. C. M. Hathaway, Chief Highway Engineer, asking for his permission for all State Engineers who are members of the I.S.P.E. to attend the annual meeting. The motion carried.

It was moved by Warren and seconded by Wiley that the Chapter go on record as giving a vote of thanks to Mr. Marbry for his untiring work and efforts for the Chapter in his capacity as Chapter Representative during the past two years. The motion carried.

There being no more business the meeting was turned over to the Program Committee which was in charge of Mr. Dolbow in the absence of Mr. Brissenden. The group was entertained by the showing of two pictures, one giving the highlights of various outstanding basketball games during the 1948-1949 season, and the other showing the history and background in the development of the many kinds of cheeses.

The meeting adjourned at 10:30 p.m.

D. R. CONNOR, *Secretary*

Central Illinois Chapter

The Central Illinois Chapter of the Illinois Society of Professional Engineers held their regular November meeting in the dining room of the Masonic Temple, Decatur, Ill., on Tuesday evening, November 29th, the attendance being 24 members and guests.

Mr. A. W. Neureuther, Chairman of the Convention Arrangements Committee, stated that detailed plans have been pretty thoroughly worked up and there is very little change from what was outlined at last month's meeting. Every effort is being made to insure the success of the Convention, and a general meeting of all Committees is expected to be held soon in order to make sure that all units are working together to the best advantage.

The Committee on Convention Entertainment, headed by R. C. Kileen, is making ample preparation for their part of the activities. Mrs. W. G. Scherer, wife of one of our past presidents, has an active group of ladies preparing for the entertainment of the ladies who attend the convention.

President Howard Bold asked that we consider the proposition suggested by the National Society for establishing a National Engineer's Week. After some discussion, the motion was made and carried that "In view of the fact that there are now so many weeks of all kinds for almost anything you want to name, therefore we should go on record as not being in favor of the proposition suggested."

Motion was made and carried that a resolution be written for the late Del Sensenbaugh who had been a very active member of our chapter for many years and had worked very faithfully in numerous capacities during that time. Copies of the resolution to be sent to the family and to the state office of the Society.

Mr. G. Lorenz Miller reported for the Committee appointed to select a candidate for the State Board to make their selection of a Junior member to sit in on State

Board meetings. The name of Mr. Kenneth E. Cowser was selected.

President Howard Bold appointed the Nominating Committee for the selection of candidates for the annual election as follows: J. R. Gardner, W. G. Scherer, and John L. Howie.

Our Vice-President, E. A. Shultz, secured two very good moving pictures for our program. The first one showed the steam turbine generating unit in various stages of manufacture and service. The second film showed the application of electric power to oil production and illustrated very clearly the mobility and dependability of this type of equipment. Both films were very much enjoyed and appreciated.

F. E. TROXEL, *Secretary-Treasurer*

Egyptian Chapter

The meeting was held after dinner at Vaughn's Cafe on January 10, 1950, with Vice-President Cromeenes presiding, present being members Burnett, Dexheimer, Kerwath, Lee, Huffman, Riseling, Setzekorn, Simonds, Speake, and guests Bitterman, Nagarkatti, and Riley.

Minutes of the last meeting were read and approved and guests presented. Mr. Cromeenes stressed attendance at the State meeting at Decatur on January 26, 27, and 28. He also extended an invitation from the Carbondale Chapter of the Illinois Association of Highway Engineers to attend its January 16th meeting and hear Mr. M. Bloch, Chief Engineer of Bridges for the Illinois Central Railroad, discuss reconstruction of their bridge over the Ohio River at Cairo.

Next came election of Chapter officers for 1950. On motion by Dexheimer with second by Setzekorn, the men recommended by the nominating committee at the last meeting were nominated. On motion by Huffman, with second by Dexheimer, they were declared unanimously elected. The Chapter officers for 1950 as elected are:

President: Mr. T. O. Cromeenes, 324 W. Walnut, Carbondale, Ill.

Vice-President: Mr. Fred H. Persson, 411 Elles Ave., Carterville, Ill.

Chapter Representative: Mr. Charles S. Ward, 1022 Oakland, Mt. Vernon, Ill.

Mr. Norman G. Bitterman, Secretary and Executive Director of Southern Illinois Incorporated, with offices at Carterville, Ill., then spoke. This is a rather unique organization, formed and supported entirely by the people of Southern Illinois, serving about 300,000 people in 150 incorporated cities and villages and in surrounding areas, formed in 1939, to preserve present industry, publicise industrial possibilities, publicise recreational possibilities, and promote Southern Illinois University.

The organization helped secure reduced freight rates on Southern Illinois Coal, sponsored the Illinois Ordnance Plant, helped change SIU to university status, and helped us get natural gas from the Big Inch. It has, in the last three years, helped place 50 new industries in Southern Illinois. It pushed development of the Crab

Orchard Lake Area. It has persuaded and assisted University of Illinois and other agencies in detailed studies of Southern Illinois, which are now available to interested parties.

Mr. Bitterman stated further that present difficulties interfering with further development are lack of adequate floor space and financing. Southern Illinois sites for nearly any kind of industry, has much raw material, and has adequate transportation. One-half population of the United States lies within 600 miles. There is an adequate labor supply. These factors are attracting industrial investigation, and Mr. Bitterman feels that concerted and intelligent effort will bring large returns to the area.

Mr. Bitterman was assisted by Dr. Nagarkatti of Bombay, India, who was sent to Southern Illinois by the Indian Government to study the activities of the organization, because of similar problems. Dr. Nagarkatti stated that India must develop industries, that it is receiving technical assistance from European countries, that it is to have a stable and democratic government, and that American participation is needed.

There was an interesting discussion.

J. L. BURNETT, *Secretary*

Lake County Chapter

The regular monthly meeting of the Lake County Chapter of the Illinois Society of Professional Engineers was held Wednesday, December 21, 1949, at the Chateau du Jour restaurant. Dinner was served to members and guests.

The business meeting was called to order by President Thacker at 7:55 p.m. The minutes of the meeting of November 16 were read and approved. The Treasurer's report was read and approved. Chairman Calkings of the Ethics and Practices committee and Chairman B. of the Co-ordinating committee announced that there was no recent business to report on. No other committee chairmen were present at this meeting. Chairman M. Gregor of the nominating committee announced that the committee was making the following nominations for officers for the year 1950:

President—S. A. Simonsen

Vice-President—C. L. Calkings

Secretary—M. T. Anderson

Chapter Representative—R. E. Anderson

There being no nominations from the floor it was moved by M. E. Staben and seconded by U. C. Neyer that the nominations be closed and that the Secretary be instructed to cast a unanimous ballot for the nomination of the nominating committee. The motion carried.

President Thacker then turned over the chair to President-Elect Simonsen who expressed his appreciation for the honor thus accorded him and announced his intention of trying his utmost to lead the chapter into greater activities during his term of office.

President Simonsen turned the meeting over to Amstutz at 8:20 p.m., who in turn introduced his ui

h Steiner Amstutz. Mr. Amstutz talked to us on
e of his early experiments in refraction of light and
making of half-tone plates for the mechanical repro-
tion of photographs.

the meeting adjourned at 9:40 p. m.

M. T. ANDERSON, *Secretary*

DuKane Chapter

Meeting of January 12, 1950, attended by 31 members
guests.

Minutes of December 8th meeting approved as read.
Treasurer's report showing a balance of \$15.81 was
epted as read.

Chairman Deuchler called on nominating committee
irman, Kasser, who submitted the following slate of
ers for the 1950 term:

For President: R. T. Cash

For Vice-President: John F. Bateman

For Secretary-Treasurer: W. A. Rakow

State Representative: W. E. Deuchler

For National Delegate: Clifford Ashley

Deuchler called for nominations from the floor for
h office in order named, and in each case, nominations
e voted closed by the entire membership and the Sec-
ary was instructed to cast a unanimous vote for the
ire slate of officers.

The new officers were introduced and thanked the
mbers for confidence and assured them a successful
ar with the help of each member.

Deuchler thanked the various committees who served
ler his leadership during the year and reminded the
mbers of the State Convention to be held at Decatur
January 26, 27, and 28.

A colored film of the Elgin Water Purification, to-
her with added comments, was presented by L. E.
lverson, Commissioner of Public Health and Safety
the City of Elgin. The picture presents the progress
the water from the deep wells to the tap in the home.
In closing the meeting, Mr. Deuchler announced the
xt session of the chapter would be on February 8th
d urged all the members to encourage other licensed
engineers to attend the meeting.

W. A. RAKOW, *Secretary-Treasurer*

Madison County Chapter

A regular meeting of the Madison County Chapter
as held on November 8, 1949, in the Quonset Office of
e Shell Oil Company at Wood River. Meeting called
order by Mr. Voorhees, President.

Minutes of the previous meeting were read and ap-
proved. The treasurer's report was given and accepted.
r. Graham discussed the plans for the annual dinner
meeting to be held December 13, 1949, at the Alton
W.C.A.

The following new officers and committeemen to serve
1950 were nominated from the floor and unanimously
ected:

President—Mr. Willard Flagg

Vice-President—Mr. George Shanahan

Secretary-Treasurer—Mr. Lester K. Meyer

Chapter Representative—Mr. W. E. Willis

Executive Committee Members—Mr. K. B. Grigsby,
Mr. Harry A. Kluge, Mr. Arthur G. Adams.

After the business meeting, Mr. Johnston, City En-
gineer of East St. Louis, Illinois, gave us a report of the
new bridge being constructed across the Mississippi
River between East St. Louis and St. Louis by the city
of East St. Louis. He also discussed the traffic problems
such a bridge causes. Following the meeting refresh-
ments were served in the Shell Cafeteria.

JAMES W. OGG, *Secretary-Treasurer*

The Annual Dinner-Meeting, December 13, 1950, at
the Y.W.C.A., was attended by 29 members and guests.
(A few came stag.) The retiring and incoming officers
made what remarks were necessary, and, while dinner
was still in progress, the rest of the entertainment began.

The Alton Little Theater presented a pleasantly varied
program, with Mr. Kendall Hunter as M.C., and Direc-
tor of Audience Participation.

Mr. Flagg, our new president, expressed the senti-
ments of the members in complimenting the Program
Committee upon the excellence of their arrangements.

Our regular monthly meeting was held in the North
Room of the Shell Oil Company Cafeteria (Wood River
Refinery) on the evening of January 10, 1950. Little
time was consumed by the business meeting. One item
of Correspondence addressed to the secretary, from Mr.
Weeks of Highland Park, Illinois, was referred to the
Registration Committee.

Eighteen members and guests were the fortunate re-
cipients of a program by Mr. Kennedy and Mr. Hum-
phrey of the Portland Cement Association, who pre-
sented a superb selection of Kodachrome scenes made in
Alaska. The photographs, and some blackboard sketches,
were used by Mr. Humphrey to illustrate his talk about
the unusual conditions met in "perma-frost" founda-
tion construction.

Based on his experiences while on special assignment
during the war, the "human interest" touches Mr. Hum-
phrey gave his talk added much to a fine program.

LESTER MEYER, *Secretary*

The automotive industry is getting one-third more ton-
miles of transportation per gallon of fuel than it was
20 years ago and the limit is not reached, Charles F.
Kettering, General Motors research consultant, says.

In an article appearing in Oil Forum, Mr. Kettering
foresaw the time when synthetic liquid fuels can be made
from raw materials at costs not out of line with present
costs of preparing fuels from natural petroleum.

In the far distant future, he predicted, "we are going
to need to turn more and more to the utilization of solar
energy. Each day in the latitude of Chicago, the average
solar energy falling on one acre of ground is enough to
operate the average car for a whole year."

VOX SECRETARII

(Continued from page 2)

delinquents on January 1st, compared with last year, is as follows:

	Now	Last Year
National.....	981	845
State.....	564	682
Affiliate.....	61	63
Engineer-in-Training.....	36
Junior.....	79	49
Student.....	55	28
Total.....	1,776	1,667

New Faces

The year ahead promises to be lively and interesting for President Ekblaw, Vice-President Gunlock, and the new members of the Board of Direction. The increased activity of the Society means more problems for its officers and Board of Direction.

Dues Payment

On December 5th last the 1950 dues statements were sent out. The response to this statement was excellent. The following chart gives the story:

	January 20, 1950	Percentage
Current.....	898	50.
In Arrears.....	765	43.
Delinquent.....	133	7
Total.....	1,776	

During the past year, the Chapter Secretaries gave much valuable assistance in helping us with this chore. Their help is again solicited and will be much appreciated.

Miscellany

Editor Oliver is to be congratulated on the fine *Illinois Engineer* silver anniversary issue of January. . . . With your help we will realize our immediate goal of 2,000 members by July 1st. . . . The 65th Annual Meeting was a demonstration that Engineers cannot only work together but also play together. . . . Hats off to Howard Bold, Andy Neureuther and the whole Central Illinois Chapter for a job well done—Champaign County Chapter has its work cut out to surpass them. . . .

FROM N. S. P. E. LEGISLATIVE BULLETIN

Second Session Set for Important Work

On January 3, 1950, the gavel fell and the Second Session of the 81st Congress was under way. Although 1950 is an election year and a short session is anticipated, much important activity looms on the horizon and a good part of this will be of direct interest to the engineering profession.

Leading the field in engineering matters will be the proposal to enact President Truman's "Point Four" program of technical assistance to the under-developed nations of the world. President Truman is said to be determined that a program of this nature must be en-

acted as a further step in containing communism. However, there will be considerable opposition to the program in the face of present and expected continuing budget deficits. It is estimated that such a program would cost \$35,000,000 in the first year and increase expenditures as the program develops. There is a considerable controversy over the form the legislation should take, with critics contending that the administration bill gives the President too much authority executing the program. Senate Majority Leader Stephen W. Lucas (D., Ill.) has indicated that Point Four will have a high priority on the crowded Congressional calendar.

Another Try at Taft-Hartley Repeal

It has been generally assumed that the administration still smarting from its defeat of last session when it attempted to repeal the Taft-Hartley Act, would lick its wounds on this score until the 82nd Congress convenes then make another all-out effort if the voters gave the administration another term. However, there are some indications that President Truman wants to let another go at his Number One objective during the Second Session of the 81st Congress. His chief advisors are said to be against this strategy, pointing out that the make-up of the Second Session is substantially the same as that of the First Session which refused to accede to his proposals. In view of the short session ahead and the probability of a second licking, the President probably not insist upon pushing the Taft-Hartley repeal issue, or at most, make only a token effort to do so. The engineering profession will have to be most watchful, however, should events take another turn, in order to work again for retention of the professional provisions of the Taft-Hartley Act. These provisions give professional employees the right of self-determination in collective bargaining situations.

Social Security on Agenda

Another high priority item for the Second Session is the extension and broadening of the federal social security system. The House of Representatives has already passed a comprehensive social security revision bill and the Senate Committee will hold hearings shortly after the session opens. Aside from their general interest in the expanded program, engineers will be affected by the decision on the inclusion of self-employed engineers. The bill passed by the House would include some self-employed engineers, but not all of them. The N. S. P. E. Board of Directors has declared that under existing circumstances self-employed engineers should be excluded from the system, as will be the case for doctors and lawyers, and this viewpoint will be presented to the Senate Committee.

Final Drive for Science Foundation

By all indications, the Second Session should mark the completion and passage of legislation to establish the National Science Foundation. This proposal has been pending for several years and there is increasing

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and among federal officials concerned with research work, as well as independent research groups and universities that the program be delayed no longer. John R. Steelman, assistant to the President, and presently acting chairman of the important National Security Resources Board, declared recently that such action would constitute the most far-reaching and important step we have taken in the field of science in the post-war world." At the same time, he stressed the fact that since the war there has been no index of the special skills of scientists in this country. This would be one of the jobs of the Science Foundation, succeeding to the work started during the war by the National Roster of Scientific and Specialized Personnel. Saying that there is no accurate information as to the extent and character of the science manpower deficit, Dr. Steelman said that the National Security Resources Board strongly feels that appropriate steps should be taken to renew this work and this may have to be done without waiting for the establishment of the Science Foundation. One of the divisions of the Foundation will be for the Mathemati-

cal, Physical, and Engineering Sciences, and engineers would be listed in the proposed roster of special skills.

Transfer of Civil Functions of Engineers

There is strong sentiment for a vigorous drive to complete most, if not all, of the Hoover Commission recommendations for more efficient and economical government during the Second Session. Perhaps the most controversial of all the Hoover Commission recommendations is to transfer the civil functions of the Corps of Engineers to the Interior Department. It is uncertain at this time whether the proposal will reach the full debate and action stage. If this does occur, it will bring forth one of the major battles in Congress and may well require the session to extend past the expected adjournment date in late June or early July.

Other Pending Engineering Items

Among the many other remaining engineer-interest matters coming over from the First Session is the bill to provide for the dissemination of technological, scientific, and engineering information through an agency of

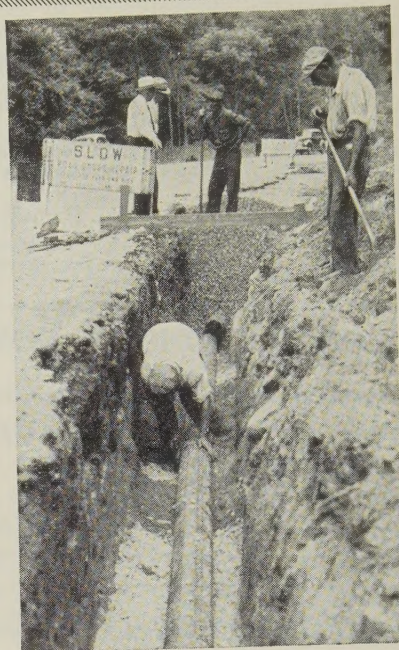
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the Commerce Department. This bill has already passed the Senate and is pending for House action.

Engineers in the District of Columbia and throughout the nation are hopeful that Congress will finally act on a registration law for the District. This bill has been pending in the House District of Columbia Committee and unofficial statements are that all obstacles have been cleared and that the committee will act on the bill during the Second Session.

In addition to these items, there will be a number of others involving the engineering profession, particularly in appropriation matters. These will include appropriations for the water pollution control work, road and airport development, public buildings and other public works, advance planning, and many others.

Registration by Branch Barred in Colorado

The District Court of Denver, Colorado, has ruled that the State Registration Board may not register engineers according to their branch of practice, but only as "Professional engineers." The decision came as the result of an action seeking to enjoin the state board from continuing its practice in this regard. The court found that the rules of the board establishing registration by branch were not authorized in the law and further held that the board was without authority to issue a roster of engineers each year. The decision will probably be appealed to the Colorado Supreme Court and is of general

importance because other states register by branch of practice under laws similar to that of Colorado.

Trial Program on Atomic Information

A trial program for examining selected declassifiable technological information in the field of metallurgy with a view to determining its possible value to American industry has been inaugurated by the Atomic Energy Commission. To assist in developing the program, a temporary advisory committee of representatives of professional societies and the business press has been appointed. The purpose of the program is to determine the possibility of providing to industry information about pumps, blowers, valves, techniques of handling metals, and other metallurgical data which will be of immediate value to industry. The trial program will determine whether such selected information can be gathered, screened, and declassified for release in a way which will not reveal the specific relevance of the information to the atomic energy program.

Ohio Society Wins Enforcement Case

The Court of Common Pleas of Delaware County has enjoined a non-registrant in the state from practicing or offering to practice engineering or surveying in the State of Ohio or from using words importing the authority to so practice. The Ohio Society of Professional Engineers describes the victory as "significant" because it is the first clear cut decision by a court of record in

State of Ohio establishing the right of a member of engineering profession to sue in equity to enjoin unlawful practice on the part of an individual not registered and admitted to practice under the state registration law. The action was brought by E. L. Luaces of the Ohio Society against Henry Turner of Delaware, Ohio. This decision is in line with a number of previous cases in which the Ohio Society has been successful in preventing the continuation of engineering practice by those not registered.

New Wage-Hour Professional Test Now Official

William R. McComb, Administrator of the Wage-Hour Division, Department of Labor, has announced the official adoption of revised regulations governing minimum wage and overtime exemption of "white collar" employees under the Fair Labor Standards Act. The exempt groups of interest to the profession are professional, executive, and administrative employees. The revised regulations will take effect on January 25, 1950, which is also the effective date of the amendments to the Wage-Hour law adopted by Congress this year. The new definition of "professional" and a discussion of the hearing officer's report was contained in the Legislative Bulletin of September 16, 1949, Vol. IV, No. 14. Meanwhile, the first administrative opinion on coverage under the revised law indicates a liberalization of test practices and decisions. The new law's wording on coverage is more definite than was previously the case and is intended to remove certain activities from inclusion under the "commerce" clause. The new ruling nullifies a previous holding applying the Act to employees of a fertilizer corporation which sold its product to local farmers who used it to grow sugarcane which was sold to a local refinery which used it to make molasses and sugar which were shipped to other states.

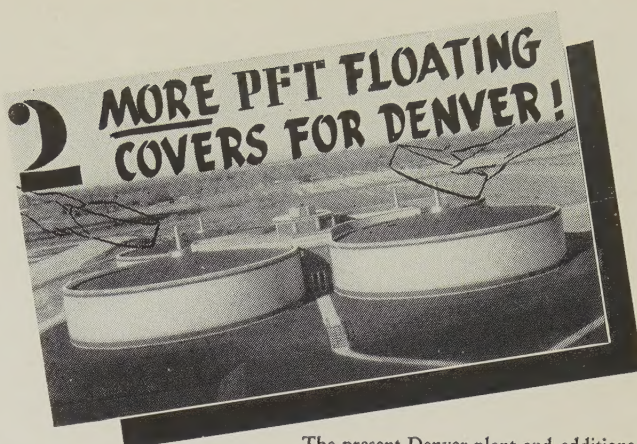
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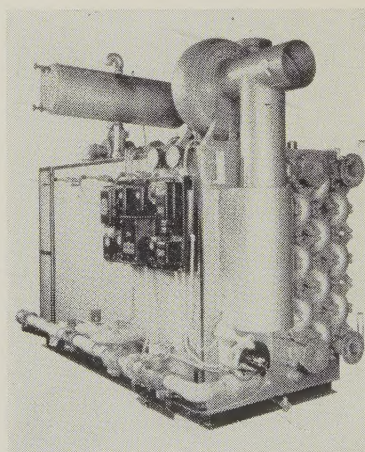
3 PFT Digester Heaters and Heat Exchangers!

The present Denver plant and additions have been designed by Black & Veatch, Consulting Engineers of Kansas City, Missouri

Supplementing its four 85' diameter Floating Cover Digesters, fast growing Denver, Colorado is adding two more similar units. When these new units are completed, the six digesters will have a capacity of over 1,000,000 cubic feet.

To assure optimum conditions and maximum operating efficiency of the digesters, three P.F.T. #1000 Digester Heater and Heat Exchangers are being installed. These units will preheat all of the raw sludge before addition to the digesters. Uniform temperatures in all digesters will be maintained by recirculating digester liquor from the various tanks through the new P.F.T. Heaters.

P.F.T. is proud to play a part in providing safe, economical sanitation for the progressive city of Denver. Send for Bulletin 232-P.F.T. Digesters.



One of three PFT #1000 Digester Heaters to be installed at Denver.

P.F.T. PACIFIC FLUSH TANK CO.
SEWAGE TREATMENT EQUIPMENT EXCLUSIVELY SINCE 1891
4241 RAVENSWOOD AVENUE CHICAGO 13, ILLINOIS
NEW YORK • LOS ANGELES • SAN FRANCISCO • CHARLOTTE, N. C. • DENVER • TORONTO



BUILD SAFETY
into old, narrow roads with
SOIL-CEMENT
shoulders

Narrow pavements flanked by soft, rutted or gullied shoulders are hazardous. As many construction and maintenance engineers have found, the economical way to make such roads safe is to pave the shoulders with soil-cement.

Soil-cement hardens these shoulders, thus providing a firm extra width of pavement onto which cars may turn safely to avoid collisions or to make emergency repairs.

Shoulders paved with durable, all-weather soil-cement are stable the year around. They neither soften in spring freezing and thawing cycles nor wash away or rut in rainy seasons.

Soil-cement shoulders prevent rutting along the pavement edges, thus ending a major driving

hazard. And by protecting the pavement edges from damage by wheels, frost or erosion, they eliminate difficult and costly maintenance.

Furthermore, soil-cement keeps the ground free from weeds and vegetation that hide the actual condition of the shoulder from the motorist.

Paving shoulders with soil-cement makes roads safe quickly, easily and economically. Roadside soil constitutes about 90 per cent of required materials. Usually only portland cement and water need be brought to the job. Needed machinery is readily available and paving is fast and easy.

Investigate this simple, inexpensive way of making narrow roads safe. Write for free literature. Distributed only in the U. S. and Canada.

P O R T L A N D C E M E N T A S S O C I A T I O N
33 WEST GRAND AVENUE, CHICAGO 10, ILLINOIS

A national organization to improve and extend the uses of portland cement and concrete through scientific research and engineering field work